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A PONDEROSA PINE TREE CLASSIFICATION

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(The following tree classification was developed for the purpose of determining, in the ponderosa pine forests of northeastern California, Oregon and Washington, the relative susceptibility of various tree classes to western pine beetle attack. Since its development, the classification has been found useful also in logging and silvicultural studies and in marking practice. The following extract gives the description and basis for this classification. Those interested in the relation of the different tree classes to bark beetle susceptibility problems are referred to the original article 1/.)

DESCRIPTION OF THE BARK BEETLE SUSCEPTIBILITY CLASSIFICATION

This tree classification is illustrated in the accompanying chart. It is based to a large extent upon the same considerations of age, dominance, and vigor which Dunning 2/ recognized as forming the basis for his seven classes. The new classification uses these same basic characteristics to regroup all ponderosa pines into a larger number of classes. The two characteristics of age and vigor are given primary importance. Four age groups are recognized, designated 1 to 4; and four degrees of crown vigor, designated A to D. Combining these two major groups gives a series of 16 classes, covering all types of trees found in a stand.

The tree class descriptions to a large extent follow those defined by Dunning, but they have been modified to apply more specifically to the mature ponderosa pine forests of average site IV quality in southeastern Oregon and northeastern California. Although trees throughout the pine region may be similarly grouped into 16 age and vigor classes, the class descriptions will have to be somewhat modified to apply in other localities and on poorer or better sites.

1/ Keen, F. P. 1936. "Relative Susceptibility of Ponderosa Pines to Bark Beetle Attack", Jour. Forestry, Vol. 34, No. 10, pp. 919-927, Oct., illus.

2/ Dunning, Duncan. 1928. "A Tree Classification for the Selection Forests of the Sierra Nevada", Jour. Agr. Res., 36: 755-771, illus.

AGE GROUPS

Trees are first divided into four age groups -- young, immature, mature, and overmature. In average site IV ponderosa pine stands of the Pacific region, the characteristics of these age groups are as follows:

1. YOUNG. Age: Usually less than 75 years. D.b.h.: Rarely over 20 inches. Bark: Dark grayish-brown to black, deeply furrowed, with narrow ridges between the fissures. Tops: Usually pointed, with distinct nodes. Branches: Upturned and whorls.

2. IMMATURE. Age: Approximately 75 to 150 years. D.b.h.: Rarely over 30 inches. Bark: Dark reddish brown, with narrow, smooth plates between the fissures. Tops: Usually pointed, but with nodes indistinct. Branches: Mostly upturned and in whorls for upper half of crown.

3. MATURE. Age: Approximately 150 to 300 years. D.b.h.: Rarely over 40 inches. Bark: Light reddish brown with moderately large plates between the fissures. Tops: Pyramidal or rounded. Branches: Upturned near top, those of middle crown horizontal, lower ones drooping; whorls incomplete.

4. OVERMATURE. Age: More than 300 years. D.b.h.: Usually of large diameter. Bark: Light yellow, the plates usually very wide, long, and smooth. Tops: Usually flat and making no further height growth. Branches: Mostly drooping, gnarled, or crooked.

In dividing trees into these four general age groups, more weight should be given to relative maturity, or what might be called "physiological age", than to exact age as indicated by annual rings. Some trees growing under favorable conditions, particularly on good sites, retain their youthful appearance and vigor much longer than do trees that have been forced to struggle against unfavorable environmental conditions, such as those on poor sites. Since trees must be judged largely on the basis of external appearances, those having all the outward characteristics of a given age group should be classed in that group, even though they are actually somewhat younger or older than the designated age limits.

The distinction between Groups 1 and 2 is largely based on color and roughness of bark. While both are sometimes called "bull pines" or "blackjacks", only the Group 1 trees have the rough black bark which is so typical of juvenile growth. The change from Group 1 to Group 2 takes place at approximately 75 years of age in the site IV stands of southern Oregon. At that age there is a slowing down in the rate of height and diameter growth, narrow plates appear between bark fissures, and the bark starts to take on the reddish-brown color characteristic of maturity. Suppression in the seedling stage may greatly extend the period of juvenile growth and advance subsequent age limits. The distinction between mature and overmature trees, Groups 3 and 4, is more difficult to recognize, and involves character of crown as well as bark differences.

VIGOR GROUPS

In judging the relative vigor of different trees of a given age, the size of crown and abundance of foliage are probably the best outward indicators. Therefore, each age group is further subdivided into four sub-groups based upon relative crown vigor. These are designated by letters A to D as follows:

A. -- Full, vigorous crowns, with a length of 55 per cent or more of the total height, and of average width or wider; foliage usually dense; position of tree isolated or dominant (rarely codominant); diameters large for age.

B. -- Fair to moderately vigorous crowns with average width or narrower, and length less than 55 per cent of the total height; either short wide crowns or long narrow ones, but neither sparse nor ragged; position, usually codominant but sometimes isolated or dominant; diameters above average for age.

C. -- Fair to poor crowns, very narrow and sparse or represented by only a tuft of foliage at the top; foliage usually short and thin; position usually intermediate; sometimes codominant, rarely isolated; diameters below average for age.

D. -- Crowns of very poor vigor; foliage sparse and scattered or only partially developed; position suppressed or intermediate; diameters decidedly subnormal, considering age.

Comparison with Dunning's Classification

According to definition, the comparison between the expanded classification and Dunning's classification is as follows:

Classes defined by Dunning	Bark-beetle susceptibility classes
1	1A, 2A
2	1B, 2B
3	3A
4	3B, 3C
5	4A, 4B, 4C
6	1C, 2C, 1D, 2D
7	3D, 4D

Or, in reverse order:

Bark-beetle susceptibility classes		Dunning's classes
Age Group	Vigor Group	
1	A, B, C, D	1, 2, 6, 6
2	A, B, C, D	1, 2, 6, 6
3	A, B, C, D	3, 4, 4, 7
4	A, B, C, D	5, 5, 5, 7

RELATIVE SUSCEPTIBILITY OF THE TREE CLASSES
TO PINE BEETLE ATTACK

From Highest to Lowest Risk

Order of Susceptibility	Tree Class	Average Diameter*	Average Volume*	Mortality Ratio*	Average Percent Trees Killed per Year*
		SUSCEPTIBLE TYPES			
1	1D	10	30	2.50	4.1
2	2C	16	160	2.24	3.9
3	4C	28	1,280	2.18	3.9
4	3C	21	540	1.60	2.9
5	1C	12	60	1.58	2.8
6	3D	14	140	1.33	2.4
7	4D	18	300	1.32	2.4
8	2D	12	70	1.20	2.1
		INTERMEDIATE TYPES			
9	4B	32	1,790	1.16	2.1
10	3B	26	930	1.10	1.9
11	2B	19	300	0.98	1.7
		RESISTANT TYPES			
12	1B	14	100	0.49	0.9
13	4A	35	2,200	0.48	0.9
14	3A	27	1,100	0.41	0.7
15	2A	20	370	0.32	0.5
16	1A	14	100	0.17	0.3
AVERAGE				1.00	1.8

*These figures apply only to the 15,000 acres of sample plots in the Klamath Region of Southern Oregon - Northern California, and to the period studied from 1928 to 1931, inclusive.

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FOR COMPARISON OF BARKBEETLE SUSCEPTIBILITY
CLASSES BASED ON AGE AND VIGOR

1A 1B 1C 1D

2

2A 2B 2C 2D

3

3A 3B 3C 3D

4

4A 4B 4C 4D

A B C D